

**What is claimed is:**

- 1           1.     A focal plane array (FPA) camera comprising:
  - 2       (I)     a voltage source adapted to supply a positive bias voltage and a negative bias voltage,  
3           the voltage source comprising:
    - 4           (IA)   a positive terminal; and
    - 5           (IB)   a negative terminal;
  - 6       (II)    a top contact coupled to the positive terminal of the voltage source;
  - 7       (III)   a bottom contact coupled to the negative terminal of the voltage source;
  - 8       (IV)   a substantially-transparent substrate coupled to the bottom contact, the substantially-  
9           transparent substrate being adapted to admit light; and
  - 10      (V)    a matrix of detectors, each detector comprising:
    - 11           (VA)   a top surface coupled to the top contact;
    - 12           (VB)   a bottom surface coupled to the substantially-transparent substrate, the bottom  
13           surface being substantially parallel to the top surface;
    - 14           (VC)   side surfaces extending from the top surface to the bottom surface, each side  
15           surface being substantially non-parallel to an opposing side surface; and
    - 16           (VD)   first-wavelength quantum-well infrared photodetector (QWIP) elements, each  
17           first-wavelength QWIP element being adapted to detect energy at a first range  
18           of wavelengths when the voltage source supplies the positive bias; and
    - 19           (VE)   second-wavelength QWIP elements, each second-wavelength QWIP element  
20           being adapted to detect energy at a second range of wavelengths when the

21 voltage source supplies the negative bias, the second range of wavelengths  
22 being different from the first range of wavelengths.

1 2. The camera of claim 1:  
2 wherein each first-wavelength QWIP element is a first quantum well adapted to  
3 detect energy at a first wavelength;  
4 wherein each second-wavelength QWIP element is a second quantum well adapted to  
5 detect energy at a second wavelength; and  
6 wherein the first quantum well and the second quantum well are separated by a  
7 blocking barrier.

1 3. The camera of claim 1:  
2 wherein each first-wavelength QWIP element is a first superlattice of quantum wells;  
3 and  
4 wherein each second-wavelength QWIP element is a second superlattice of quantum  
5 wells.

- 1           4.     A multi-wavelength detector system comprising:
- 2     (I)    a focal plane array (FPA) camera comprising:
- 3           (IA)   a voltage source adapted to supply a first bias voltage, the voltage source
- 4                further being adapted to supply a second bias voltage;
- 5           (IB)   first-wavelength detectors coupled to the voltage source, the first-wavelength
- 6                detectors having non-parallel sides, the first-wavelength detectors being
- 7                adapted to detect energy at a first range of wavelengths when the voltage
- 8                source supplies the first bias voltage, the first-wavelength detectors further
- 9                being adapted to generate photocurrents proportional to the detected energy at
- 10              the first range of wavelengths; and
- 11          (IC)   second-wavelength detectors being coupled to the voltage source, the second-
- 12              wavelength detectors having non-parallel sides, the second-wavelength
- 13              detectors being adapted to detect a second range of wavelengths when the
- 14              voltage source supplies the second bias voltage, the second-wavelength
- 15              detectors further being adapted to generate photocurrents proportional to the
- 16              detected energy at the second range of wavelengths; and
- 17     (II)   a processor coupled to the FPA camera, the processor being configured to generate a
- 18              first-wavelength two-dimensional image, the first-wavelength two-dimensional image
- 19              being generated from the photocurrents proportional to the detected energy at the first
- 20              range of wavelengths, the processor further being configured to generate a second-
- 21              wavelength two-dimensional image, the second-wavelength two-dimensional image
- 22              being generated from the photocurrents proportional to the detected energy at the
- 23              second range of wavelengths.

1           5.     The system of claim 4, further comprising:  
2           a display adapted to display the first-wavelength two-dimensional image, the display  
3 further being adapted to display the second-wavelength two-dimensional image.

1           6.     The system of claim 5, wherein the display is further adapted to substantially  
2 concurrently display the first-wavelength two-dimensional image and the second-wavelength  
3 two-dimensional image.

1           7.     A detector comprising:  
2           a first contact;  
3           a second contact;  
4           a substantially-transparent substrate coupled to the second contact, the substantially-  
5 transparent substrate being configured to admit light;  
6           a voltage source electrically coupled to the first contact and the second contact, the  
7 voltage source being adapted to supply a first bias voltage between the first contact and the  
8 second contact, the voltage source further being adapted to supply a second bias voltage  
9 between the first contact and the second contact;  
10          a top coupled to the first contact;  
11          a bottom coupled to the substantially-transparent substrate, the bottom adapted to  
12 receive the light admitted through the substantially-transparent substrate;  
13          sides extending from the top to the bottom, each side being substantially non-  
14 perpendicular to the bottom, each side being adapted to redirect the admitted light;  
15          a first-wavelength quantum-well infrared photodetector (QWIP) element adapted to  
16 detect energy proportional to a first range of wavelengths when the voltage source supplies  
17 the first bias voltage; and  
18          a second-wavelength QWIP element adapted to detect energy proportional to a  
19 second range of wavelengths when the voltage source supplies the second bias voltage.

1           8.     The detector of claim 7:  
2           wherein the first contact is a metal contact; and  
3           wherein the second contact is a metal contact.

1           9.     The detector of claim 7, wherein each side is substantially non-parallel to an  
2     opposing side.

1           10.    The detector of claim 7:  
2           wherein each first-wavelength QWIP element is a first quantum well adapted to  
3     detect energy at a first wavelength;  
4           wherein each second-wavelength QWIP element is a second quantum well adapted to  
5     detect energy at a second wavelength; and  
6           wherein the first quantum well and the second quantum well are separated by a  
7     blocking barrier.

1           11.    The detector of claim 7:  
2           wherein each first-wavelength QWIP element is a first superlattice of quantum wells,  
3     the first superlattice of quantum wells being adapted to detect energy at a first range of  
4     wavelengths; and  
5           wherein each second-wavelength QWIP element is a second superlattice of quantum  
6     wells, the second superlattice of quantum wells being adapted to detect energy at a second  
7     range of wavelengths.

1           12.    A voltage-tunable multi-color infrared (IR) detector element comprising:  
2           a substantially-planar surface adapted to admit light; and  
3           means for redirecting the admitted light.

1           13.     A voltage-tunable multi-color infrared (IR) detector element comprising:  
2                 a substantially-planar surface adapted to admit light; and  
3                 sides extending from the substantially-planar surface, each side being substantially  
4 non-perpendicular to the substantially-planar surface, each side being adapted to redirect the  
5 light admitted through the substantially-planar surface.

1           14.     The detector element of claim 13, wherein each side is substantially non-  
2 parallel to an opposing side.

1           15.     The detector element of claim 13, wherein each voltage-tunable multi-color  
2 IR detector comprises:  
3                 a first superlattice of quantum wells, the first superlattice being adapted to detect  
4 energy at a first range of wavelengths; and  
5                 a second superlattice of quantum wells, the second superlattice being adapted to  
6 detect energy at a second range of wavelengths.

1           16.     The detector element of claim 13, wherein each voltage-tunable multi-color  
2 IR detector comprises:  
3                 a first quantum well adapted to detect energy at a first wavelength; and  
4                 a second quantum well adapted to detect energy at a second wavelength.

1           17.     A light-detection method comprising the steps of:  
2           receiving incident radiation;  
3           reflecting the incident radiation at an angled surface; and  
4           directing the reflected radiation through a voltage-tunable multi-color infrared (IR)  
5     detector element.

1           18.     The method of claim 17, further comprising the step of:  
2           supplying a first bias voltage to the voltage-tunable multi-color IR detector element to  
3     detect energy at a first range of wavelengths.

1           19.     The method of claim 18, further comprising the step of:  
2           generating a first-wavelength image, the first-wavelength image being generated from  
3     the detected energy at the first range of wavelengths.

1           20.     The method of claim 18, further comprising the step of:  
2           supplying a second bias voltage to the voltage-tunable multi-color IR detector  
3     element to detect energy at a second range of wavelengths.

1           21.     The method of claim 20, further comprising the step of:  
2           generating a first-wavelength image, the first-wavelength image being generated from  
3     the detected energy at the first range of wavelengths; and  
4           generating a second-wavelength image, the second-wavelength image being  
5     generated from the detected energy at the second range of wavelengths.